

## An Open Reduction or Conservative Treatment for Congenital Radial Head Dislocation in Children

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### Abstract

**Background:** Chronic radial head dislocation can be either congenital, developmental or post-traumatic. Congenital dislocation of the radial head is rare, although it is the most common congenital anomaly of the elbow. It can occur unilateral and bilateral and has been described as an isolated abnormality, as well as a feature of syndromes.

**Materials and Methods:** In a prospective study 5 patients with the age of 11.2 years (range. 6 to 15 years) who congenital Radial head Dislocation, there were 3 children underwent Ulnar and Radial osteotomy combined annular ligament reconstruction, and 2 children conserved treatment. We used Kim's score for evaluation of our results.

**Results:** The duration of follow-up was 46.6 months (range: 34 - 72 months).

Range of motion measurements mean Pre/Post treatment: Flex-Ext: 122°/128°; Pronation arc: 66°/69°; Supination arc: 72°/76°; Total arc: 260°/273°. Elbow Performance score with mean Pre/Post treatment: Deformity: 14/19; Elbow Pain: 16/23; Motion: 25/25; Function: 17/19; Total: 72/86. Surgical result: Excellent in 1 case, Good in 1 case, Fair in 1 case.

**Conclusion:** Congenital dislocation of the radial head is rare, although it is the most common Congenital anomaly of the elbow. If the child complaints or has limitations of forearm/elbow's movement, he/she should be operated early to prevent some complications of chronic radial head dislocation.

**Keywords:** Congenital Radial Head Dislocation; Ulnar Osteotomy; Annular Ligament Reconstruction; Missed Radial Head Dislocation

### Introduction

Congenital dislocation of the radial head (CDRH) is a rare condition that diagnosed until years after birth [1,2], but when children the limitation in range of motion (ROM) and deformity of the elbow or elbow pain [1,3]. Chronic radial head dislocation can be congenital, developmental or post-traumatic [3,4]. CDRH is rare, although it is the most common congenital anomaly of the elbow. It can occur unilateral and bilateral and has been described as an isolated abnormality, as well as a feature of a number of syndromes [1,5]. Often, it coexists with other anomalies, but it also can be present in an isolated form [6,7].

Radiographic criteria have been established to distinguish this lesion from a chronic traumatic dislocation. These include a small, dome-shaped radial head; a hypoplastic capitellum: ulnar bowing with volar convexity in anterior dislocation and dorsal convexity in posterior dislocation: and a longitudinal axis of the radius not bisecting the capitellum [3,6].

However, pain in the wrist, proximal migration of the radius, regrowth of the radial head, the valgus instability at the elbow with potential ulnar-nerve palsy, radio-ulna synostosis, and weakness are the long term results of the compromising.

The purposes of the study is presented our experiences and results of treatment with Open reduction (OR), Radial and Ulna Osteotomy (R-UO), combined Annular Ligament Reconstruction (ALR) and Conserve for CDRH.

### Materials and Methods

A retrospective study was carried out to evaluate the results of operative treatment or conservation performed from January 2009 and September 2014 in 5 patients of CRHD in the department of orthopaedics, Nation Hospital for Pediatrics. The operations were performed by single surgeon (Author). The study had the approval of the Ethical Review Committee of our Institute and was carried out in accordance with the tenets of the Declaration of Helsinki.

All children presented had no history of trauma or had a history of previous elbow pathology or surgery.

### Radiographic criteria

In the normal elbow, the central axis of the radius should pass through the center of the capitellum (Storen's line). This holds true for all projections, and whether the radial head is ossified or not. The ulna and radius should be scrutinized for plastic deformity or "bow sign", with apex in the direction of radial head dislocation. The posterior ulnar cortex should be straight. Injury films should be followed with post reduction X-rays to confirm concentric reduction of the ulnohumeral and radiocapitellar joints.

The status of the radial head reduction was evaluated. Radiographs (full length of the forearm) were obtained by placing the child's arm on the X-ray cassette with the elbow flexed 90° in the lateral position and the palm down. We have found that this method provides a true anterior-posterior image of the forearm, thus visualizing any bowing present in the ulna or radius. It also allows visualization of the radial head dislocation by providing a true lateral image of the elbow (Figure 1).

### Clinical criteria

The physical examination included evaluation of the range of motion of both elbows and wrists; grip-strength testing, averaging three trials with a dynamometer [7]; and quantitative determination of pain, stability of the radio-ulnar joint, Carrying angle of the elbow, and stability to varus and valgus stress. Flexion of the elbow was determined with use of a goniometer that was placed along the lateral aspect of the upper extremity and centered on the joint with the proximal arm of the device parallel to the humerus and the distal arm parallel to the radius. Flexion of the wrist was tested in a similar manner, with the device centered on the joint and aligned along the radius and first metacarpal. Radial and ulnar deviation of the wrist were measured by aligning the goniometer with the radius and third metacarpal on the dorsum of the extremity. To determine supination and pronation, the patient's elbow was placed against the thorax, the elbow was flexed to 90 degrees, the examiner's fingers were placed on the radial and ulnar styloid processes, and the patient was asked to rotate the joint maximally. Care was taken to isolate the range of motion of the forearm and not to include compensatory carpal rotation in the measurement. A goniometer with one of its arms parallel to the floor was aligned so that the other arm matched an imaginary line between the examiner's fingers. The complement of each of the measured angles was recorded as the appropriate measurement of supination and pronation.

### Range of motion (ROM) measurement

Pre-posterior treatment ROM, expressed as the sum of the flexion-extension arc and pronation-supination arc, was determined with a hand held goniometer using standard methods. We defined a full flexion-extension arc as 140°, a full pronation arc as 75°, and a full supination arc as 85° [8].

**Elbow performance score**

We adopted new criteria after the study was already underway when it was determined that the patients' satisfaction was not limited to any single factor. For example, deformity was so sensitive a factor for patients and parents in this study that it acted as the entire reason to have treatment in some patients. Post-treatment satisfaction was also variable. Thus, the currently used scoring system of the elbow could not reflect the pre and post-treatment evaluation of the CRHD precisely.

**Surgical Technique**

The surgery was performed with the patient lying in the prone position with the elbow flexed. Under general anaesthesia and tourniquet applied on the upper arm. Under tourniquet, we performed the surgery through a two approach.

The first incision on the anterior aspect of the proximal forearm was for radial shortening (Henry approach). The radial shaft was osteotomised before we performed the radial head relocation to facilitate the reduction. The radial shaft was stabilized by Kirschner wire with a 1.7 mm (Figure 2).

Second skin incision a postero-lateral skin incision was made to expose the radio-capitellar [9]. The substance of the reflected supinator protects the deep branch of the radial nerve. Reduction of the radial head into radial notch of proximal ulna was attempted, and its stability was assessed if the proximal radius still unstable, maintain the reduction temporary oblique pin from the radius to the proximal ulna.

A straight osteotomy is made at the metaphyseal-diaphyseal junction. The osteotomy site is then angulated and lengthened simultaneously. The osteotomy is then fixed with a one-third tubular plate that has been bent to match the induced deformity (the plate was bent to 30°). The most proximal screw is cancellous and this simple construct combined with 6 weeks of casting was entirely sufficient.

**Annular ligament Reconstruction**

The bone tunnels were created using a 3.5-mm drill at the level of annular ligament. A strip of fascia lata with width of 1 cm and length of 6 - 8 cm was obtained from distal one third thigh is passed and wrapping it around the radial neck from the ulnar and securing it through a drill hole in the ulna [10].

A Kirschner wire was drilled percutaneously through the capitellum into the radial head with the elbow in 90 degrees of flexion and supination. The patients the ulna was fixed with a plate and screws. It was not necessary to perform radial osteotomy, temporary transarticular radio-capitellar wire stabilization.

Wound was closed in layers, and immobilized for 6 weeks in a plaster cast at 90° flexion in supination. We fixed the radius with a transcapsular K wire in all cases, and the wire were removed after 6 weeks. Post-operative 6 weeks, removed plaster cast and we encouraged gentle active movement of the elbow. The patients were followed up at 3, 6, 12 months and then on yearly basis.

**Evaluating Result Treatment**

A new scoring system was subsequently based on the four parameters that the patients most considered as problems that needed to be solved: deformity, pain, ROM, and function. The four parameters were weighted equally, 25 points each, for a perfect score of 100 points: 1) deformity: 25, no concern; 15, minor concern; 0, major concern; 2) pain: 25, no pain; 15, intermittent mild pain but not limiting activities; 0, pain, limiting activities; 3) range of motion (sum of the flexion-extension and pronation-supination arcs): 25, > 250°; 15, 250° - 200°; 0, < 200°; 4) function: five activities of daily living (comb hair, feed self, open doorknob, hold on to subway overhead rail, put on shoes with hands) were identified and were given a weight of 5 points each if the patient could perform such tasks without a problem. If the patient could not accomplish these tasks, a zero was given for each task he or she failed to perform without difficulty. Total elbow performance score was graded as excellent (90 or more points), good (89 - 75 points); fair (74 - 60 points); or poor (< 60 points) [11].

**Statistical analysis**

The data were analysed with Epi Info 6.04 software public domain statistical software for epidemiology, developed by Centers for Disease Control and Prevention (CDC) in Atlanta, Georgia, USA, <http://wwwn.cdc.gov/epiinfo/html/prevVersion.htm>. We performed the  $\chi^2$  test for percentage and the t-student test for mean comparison between the preoperative and postoperative groups. P-values  $\leq 0.05$  were regarded as statistically significant. All readings were provided as average values together with the appropriate standard deviation.

**Results**

There were five patients in this study. The average age at the time of the operation was 11.2 years (range. 6 to 15 years). There were 3 patients had operated and 2 patient with a conservative course of observation. The mean duration of follow-up was 46.6 months (range, 34 - 72 months).

There was combine Congenital dislocation of the Hip in 1 case and Congenital deficient long Femur in 1 case (Table 1).

According to the questionnaire, the primary indication for the index treatment was limitation of motion, especially rotation, in five elbows with range of motion measurements (in degree) mean Pre/Post treatment: Flex-Ext: 122°/128°; Pronation arc: 66°/69°; Supination arc: 72°/76°; Total arc: 260°/273° (Table 2).

Elbow Performance score with mean Pre/Post treatment: Deformity: 14 (SD = 8.9)/19 (SD = 5.5) P-value 0.012228; Elbow Pain: 16 (SD = 10.2)/23 (SD = 4.5) P-value 0.001557; Motion: 25 (SD = 0)/25 (SD = 0); Function: 17 (SD = 5.7)/19 (SD = 5.5) P-value 0.206236; Total: 72 (SD = 17.2)/86 (SD = 13.4) P-value 0.000106. Surgical result: Excellent in 1 case, Good in 1 case, Fair in 1 case (Table 3).

**Pain**

There was some pain in three of the five elbows preoperatively. The pain was characterized as mild in two and moderate in one of the affected arms. However, there was a decrease in pain compared with the preoperative level in three of the five patients. In this study without pain in wrist.

**Activity**

Patients were reported of no difficulty related to the involved extremity in performing their job. Four patients were described interference with athletic activities, especially sports such as tennis, basketball and volleyball. which necessitate major use of the upper extremity. Activities of daily living were compromised in two patients who were reported difficulty with pouring from a heavy pitcher.

**Radiographic findings**

The preoperative radiographs revealed all dislocations of the radial head according to established congenital radiographic. One patient has the posterior dislocation and the rest four have anteriors.

**Findings on Physical Examination**

Analysis of motion of the elbow revealed an overall post-treatment arc of motion: Range of motion was measured average (degree) Pre/Post treatment: Flex-Ex: 122° (AD = 7.6)/128° (SD = 5.7) P-value: 0.003156; Pronation arc: 66° (AD = 4.2)/69° (SD=2.2) P-value 0.02115; Supination arc: 72° (SD = 2.7)/76° (SD = 4.2) P-value: 0.005221; Total arc: 260° (SD = 12.2)/273° (SD = 4.5) P-value 0.000012. Overall motion of the elbow post-treatment was significant with P-value  $< 0.05$ ; except the pronation arc was not a significant (P-value: 0.02115).

There were 3 cases have been operated and 2 cases have been conserved. Average age at treatment: 11.2 years; Follow-up time: 46.6 months. One case was combined Congenital deformity with Congenital Dislocation of the Hip; and one was Congenital deviceint long Femur.

Case	Gender	Side	Deformity type	Other Deformities		Patient's age and Approach		Follow-up period (month)
				Patient	Family	Operation (Years)	Conservation (Years)	
1	Female	Left	Anterior	No	No	15.0		34
2	Male	Right	Anterior	No	No	13.0		42
3	Female	Left	Anterior	CDH	No	12.0		46
4	Male	Left	Anterior	No	No		10.0	72
5	Female	Left	Posterior	DLF	No		6	39

**Table 1:** Clinical data of the Patients.

CDH: Congenital Dislocation of the Hip; DLF: Deviceint Long Femur

Case	Preoperative				At follow - up			
	Flex-Ext arc (°)	Pronation arc (°)	Supination arc (°)	Total arc (°)	Flex-Ext arc (°)	Pronation arc (°)	Supination arc (°)	Total arc (°)
1	120	65	75	260	125	70	80	275
2	110	60	70	240	130	70	70	270
3	125	65	70	260	130	65	75	270
4	130	70	70	270	135	70	75	280
5	125	70	75	270	120	70	80	270

**Table 2:** Range of motion measurements (in degree).

Range of motion measurements (in degree) mean Pre/Post treatment: Flex-Ext: 122° (AD = 7.6) /128°(SD = 5.7) P-valuate 0.003156 ; Pronation arc: 66°(AD = 4.2) /69° (SD = 2.2) P-valuate 0.02115 ; Supination arc: 72° (SD = 2.7) /76° (SD = 4.2) P-valuate 0.005221; Total arc: 260°(SD = 12.2)/273°(SD=4.5) P-valuate 0.000012

Case	Preoperative						At follow - up					
	Deformity	Pain		Motion	Function	Total	Deformity	Pain		Motion	Function	Total
Elbow		Wrist	Elbow					Wrist				
1	15	15	25	25	20	75	25	25	25	25	25	100
2	15	0	25	25	15	55	15	25	25	25	15	80
3	15	15	25	25	10	65	15	15	25	25	15	70
4	25	25	25	25	25	100	25	25	25	25	25	100
5	0	25	25	25	15	65	15	25	25	25	15	80

**Table 3:** Elbow performance score.

% Improvement + [(B-A)/A] X 100 (A: Preoperative mean ROM in each arc; B: at follow - up in each arc) Total elbow score: Excellent. ≥ 90; Good, 89-75; Fair, 74-60; Poor ≤ 60. Total points for Elbow performance score without wrist point.

Elbow Performance score with mean Pre/Post treatment: Deformity: 14 (SD = 8.9)/19 (SD = 5.5) P-valuate 0.012228; Elbow Pain: 16 (SD = 10.2)/23 (SD = 4.5) P-valuate 0.001557; Motion: 25 (SD = 0)/25 (SD = 0); Function: 17 (SD = 5.7)/19 (SD = 5.5) P-valuate 0.206236; Total: 72 (SD = 17.2)/86 (SD = 13.4) P-valuate 0.000106. Surgical result: Excellent in 1 case, Good in 1 case, Fair in 1 case

**Report of Cases**

**Case 1:** Male was 15 years old. He presented a slight prominence in the outer part of left antecubital fossa, causing him mild pain and discomfort since incurred a trivial injury to his elbow two months previously. He insisted that this prominence was present since birth, but with pain or significant functional difficulty of the elbow. She had no history of trauma and no family member had elbow deformities. The child had no other deformities or congenital anomalies.

On examination, there were 20° restriction of the elbow flexion, flexion-extension arc as 120°, a full pronation arc as 65°, and a full supination arc as 75°

X-rays showed anterior dislocation of the radial head which appeared underdeveloped and domed, the upper third of the ulna being large and bent forward and radially (Figure 1).



**Figure 1:** Showed anterior dislocation of the radial head which appeared underdeveloped and domed, the upper third of the ulna being large and bent forward and radially.

The patient was performed R-U osteotomy combined ALR (Figure 2). Post-operative thirty - four months, had painless elbow but with the same range of pre-operative movements (full flexion-extension arc as 125°, a full pronation arc as 70°, and a full supination arc as 80°).



**Figure 2:** Patient was performed R-U Osteotomy combined ALR.

**Case 2:** Male was 13 year old. The parents reported that since newborn, he kept his right forearm pronated and painless click was heard on elbow movements. Few months before operation, his elbow was pain when he lifted heavy weigh things. His outer part of the elbow was founded prominence. He had no history of trauma and no family member had elbow deformities. On examination, the child had no other deformities or congenital anomalies.

Clinically there was about 30° restriction of extension and a click was heard on rotation. On examination, there were flexion-extension arc as 110°, a full pronation arc as 60°, and a full supination arc as 70°.

X-rays showed (Figure 3) anterior dislocation of an underdeveloped radial head, flat capitellum and a posterior bowing of the upper ulna.

The patient was performed R-U osteotomy combined ALR (Figure 4). Post-operative fourty- two months, the full flexion-extension arc as 130°, a full pronation arc as 70°, and a full supination arc as 70°).



**Figure 3:** X-rays showed anterior dislocation of an underdeveloped radial head.

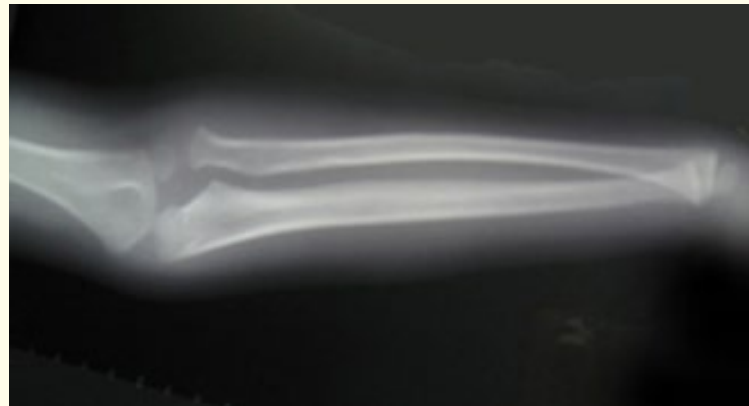


**Figure 4:** Patient was performed A-U Osteotomy combined ALR.

**Case 3:** Non-tender radial head could be palpated anteriorly. Child had congenital dislocation of the hip. She had no history of trauma and no family member elbow deformities.

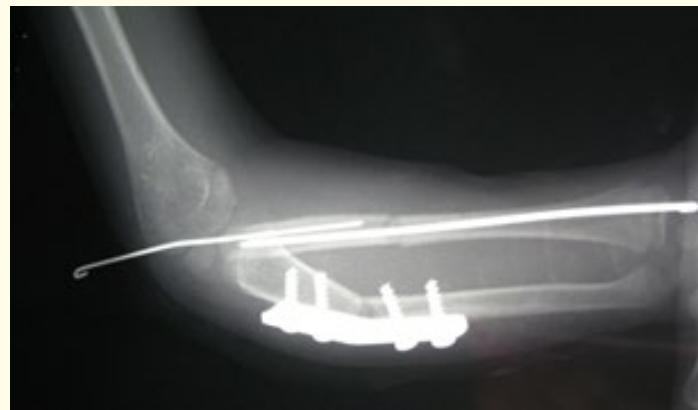
A non-tender osseous protrusion could be palpated subcutaneously, anterior to the left elbow joint. With full flexion-extension arc as 125°, a full pronation arc as 65°, and a full supination arc as 70°. There was no instability on varus or valgus stress of the elbow joint. There were no neurological or vascular disturbances in the forearm or hand.

Anteroposterior radiographs revealed that the radial head was displaced laterally. The lateral radiograph showed an anterior dislocation of the radial head, and the proximal metaphysis had a convex deformity (Figure 5). The radiographs did not show any evidence of post-fracture remodeling or any evidence to suggest that these abnormalities were secondary to trauma. There were no neurological or vascular disturbances in the forearm or hand.



**Figure 5:** X-rays showed anterior dislocation of an underdeveloped radial head.

The patient was performed R-U osteotomy combined ALR (Figure 6). Post-operative forty- six months, had mild pain elbow but with the full flexion-extension arc as 130°, a full pronation arc as 65°, and a full supination arc as 75°).



**Figure 6:** Patient was performed R-U Osteotomy combined ALR.



**Case 4:** A 10-year-old boy, he had no trauma and no family member elbow deformities. The boy was practicing sports without pain or functional impairment. On examination, the child had no other deformities or congenital anomalies. There was about 10° restriction of extension and a click was heard on rotation. On examination, there were a flexion-extension arc as 130°, a full pronation arc as 70°, and a full supination arc as 70°.

The anteriorly displaced left radial head was prominent and could be easily palpated without pain. The elbow was stable, there were no neurological or vascular disturbances in the forearm or hand and no other deformities.

Radiographs showed the anterior dislocation of the left radial head, as well as a small epiphysis of the radial head compared to the opposite side (Figures 7 and 8). 6 years later, the clinical findings were unchanged (flexion-extension arc as 135°, a full pronation arc as 70°, and a full supination arc as 75°).



**Figure 7:** X-rays showed anterior dislocation of an underdeveloped radial head.



**Figure 8:** X-rays showed Deformity of a radial head and underdeveloped radial head.

**Case 5:** An 6-year-old girl with a rapidly increasing valgus angle of the left elbow presented at the out-patient clinic of our hospital. No evident trauma of the affected elbow had occurred. In another hospital, she had been diagnosed with a unilateral congenital radial head dislocation of the left elbow and congenital deficient long femur at the age of 12 months, for which a conservative treatment was initiated. Besides the increasing deformity, the patient had no complaints of pain or limitations. The left elbow showed a cubitus valgus with clinically- a carrying angle of 15°. The dislocated radial head was not painful on palpation. The range of motion was nearly full: With full flexion-extension arc as 125°, a full pronation arc as 70°, and a full supination arc as 75°.

Plain radiographic evaluation of the left elbow showed an posterior radial head dislocation and radial bow at 12 months old (Figures 9 and 10), with a long narrow neck and a hypoplastic capitellum (Figure 11); showed antero-lateral radial bow and the radial head dislocation at 6 years old (Figure 12). Storen's line had not bisected the capitellum.



**Figure 9:** X-rays showed posterior radial head dislocation at 12 months old.



**Figure 10:** X-rays showed an underdeveloped radial head and posterior dislocation at 12 months old.



**Figure 11:** X-rays showed posterior dislocation at 6 years old.



**Figure 12:** X-rays showed antero-lateral radial bow and posterior Radial head dislocation at 6 years old.

Whilst no complaints or limitations were present, treatment was non-operative with clinical observation. No restrictions in daily elbow use were advised. The result of this treatment strategy was after a follow-up of thirty - nine months full flexion-extension arc as 120°, a full pronation arc as 70°, and a full supination arc as 80°. No increase in valgus angle was seen, and elbow function was not painful.

**Discussion**

**Etiology**

Congenital radial head dislocation is the most common congenital anomaly of the elbow, with an estimated incidence rate of 0.06% to 0.16% [1]. Almquist., *et al.* (1969) [12] reported that Posterior dislocation is most common (65%), Anterior dislocation occurs in 18% of the cases and lateral in 17%. In approximately 60% of all cases, congenital dislocation of the radial head is seen in conjunction with various syndromes (e.g. nailpatella syndrome, Silver’s syndrome, Ehlers-Danlos syndrome), congenital radioulnar synostosis, mental retardation, and scoliosis [13]. Furthermore, posterior dislocations may have an autosomal-dominant or X-linked recessive inheritance. Although it is most often bilateral, unilateral congenital radial head dislocation has been described [5].

The exact cause of CRHD remains unknown. There have been reports of familial occurrence, but no definitive hereditary pattern has been established [14,15]. Some believe that an abnormal capitellum formation in utero at the base of the disorder [1,16]. Trauma to be the cause of radial head dislocations in newborn, especially if it occurs unilateral. A pulled elbow of infancy resulting in radial head subluxation and laxity of the annular ligament may occur as shortly after birth. If not treated by closed reduction, persistent radial head dislocation may result in similar deformities as in children with a CRHD [1,4]. Developmental causes of radial head dislocation include an inadequate length of the radius and multiple hereditary osteochondromatosis [4].

Now, some criterias had been used diagnosing CRHD was keys:

McFariand’s criteria. 1936 [17]	Mardam-Bey and Ger criteria. 1979 [3]
1. Retively short ulna or long readius	1. Bilateral involvement
2. Hypoplastic or absent capitellum	2. Familial history
3. Partially defective trochlea	3. Concomitial congenital anomalies
4. Prominent alnar epicondyle	4. No history of trauma
5. Groove in distal radius	5. Not reducible by closed methods
6. Dome shaped radial head with long marrow neck	6. Dislocation seem at birth

### Clinical

Congenital dislocation of the radial head is a rare condition that frequently is not diagnosed until years after birth [2]. It is often not noted until the age of four or five [2,19]. The usual clinical was founded consist of a very small limitation of the joint movements and slight deformity due to the dislocated radial head. McFarland found little restriction of elbow movements in 5 of his 11 cases [17].

Radial head dislocation presented as congenital dislocations or posttraumatic [5,12,13,16,20]. In our cases there was no trauma. Congenital radial dislocation, especially the posterior type, is often associated with a variety of anomalies and syndromes [5,12,15,21], but in our cases clinical examination showed no further deformities or anomalies. Almquist, *et al.* (1969) [12] reported that almost half of congenital radial head dislocations were anterior, almost half posterior and one tenth lateral. Almost half of the dislocations were bilateral. We had 4 cases of unilateral anterior, 1 case of unilateral posterior radial head dislocation in this study (Table 1).

### Strategy of treatment

We elected to proceed with a conservative course of several reasons. First, the dislocated radial head produced no clinical symptoms. Second, the deformity was cosmetic, not functional. Third, the dislocation was intracapsular.

### Conservative Treatment

There were 2 cases, we not operate CRHD in this study. If discovered in a young child. However, typically teenagers, pain be an issue have been very happy with our results with this operation but there are a couple of issues for families to consider (Table 2 and 3). First, the radius can move slightly (away from wrist). If it does, the ulna becomes prominent at the wrist and can be painful. This can, in a small percentage of patients, require another surgery. Second, we worry about the stability of the elbow and possibility of development of arthritis. And third, excision of the radial head may improve elbow motion (best for rotation) but obviously does not make it normal [22].

There were a nonoperative course of observation [13,16,20,23-26]. There were 2 patients have used of observation in this study (Table 1).

### Surgical Methods

Most authors agree that the indication for an operation must be carefully considered. We agree Campbell's opinion that "The surgeon's indications for the operation were pain and a decreased range of motion" [25].

Resection is advised in a symptomatic patient after reaching skeletal maturity, because of the risk of regrowth if performed too early. Excision usually relieves pain, but does not always lead to significant functional improvement. If have to operate, Open reduction and ligament reconstruction may offer advantages over late radial head resection if performed before the age of 2 years [10]. We agree with Blount [27] that: Certainly, the admonition "Never excise the radial head in a growing child".

Surgery at an earlier age with open reduction and ligament reconstruction may offer advantages over late radial head resection [12]. We agree with Wood [28] that early reconstruction may prevent the long term complication of pain, loss of motion, deformities and osteochondral loose bodies. Ideally the care of congenital dislocation of the radial head would involve open reduction and restoration of

normal anatomy. If the radial head can be reduced early, the deformity of the capitellum and the forearm may not occur or remodel with growth [28].

Although literature refers to the treatment of radial head dislocation by means of an ulna osteotomy, as described by Hiramaya and coworkers [29], the main indication of this procedure is the presence of residual deformity of the ulna or radius with a concave radial head articular surface [30]. The surgical technique consists of an ulnar osteotomy with lengthening and angulation or ulnar rotation osteotomy, providing sufficient place for the dysplastic head while avoiding excessive pressure on the radial head [31]. In our there was no deformity of the ulna, but there was lengthening of the radius with a domed radial head.

Due to relative radial lengthening and radial bow, it would have been difficult to reduce the radial head in the radiocapitellar joint. Pre-operative templating was done to assess the amount of shortening required for the easy reduction and maintenance of adequate joint space. We were cautious not to excise the radial head in our cases because of the risk of secondary subluxation of the distal radioulnar joint due to proximal migration of the radius [32,33]. We believe on the basic of our results that surgical correction is fully justified in irreducible dislocation of the radial head. We also believe that shortening of the radius would have been necessary to achieve reduction in cases where there is radial lengthening. We have performed shortening of the radius of patients have been operated in this study.

Author	Number Patient	Age at Operative (Years)	Approach	Follow-Up (Months)	Pre-Post Operation of ROM			
					Pain	Flexion - Extension	Pronation	Supination
Exarhou 1970 [6]	2	18	EHR	6	Pa/Pail	110°/110°	75°/75°	85°/85°
		16	EHR	14	Pa/Pail	110°/110°	75°/75°	85°/85°
Campbell 1992 [25]	8	13	EHR	84	Pa/Pail	Improve >11°	Improve > 53°	
Bengard 2012 [23]	16	No	EHR	No	Pa/Pa.Relief	110°/102°	100°/119°	
Karuppal. 201 [34]	1	8	U&R Osteo	12	Pa/Pail	130°/130°	75°/75°	Improve > 40°
Hung. 2017	3	15	U&R Osteo, ALR	34	Pa/Pail	120°/125°	65°/70°	75°/80°
		13	U&R Osteo, ALR	42	Pa/Pail	110°/130°	60°/70°	70°/70°
		12	U&R Osteo, ALR	46	Pa/Pail	125°/130°	65°/65°	70°/75°

Table 4: Compared postoperative results between Excision of the head of the radius and Ulnar and Radial Osteotomy.

EHR: Excision of the head of the radius; U&R Osteo: Ulnar and Radial Osteotomy; ALR: Annular Ligament Reconstruction; Pa: Pain; Pail: Painless; Pa.Relief: Pain Relief; No: No report; Range of Motion: ROM.

There were 30 patients in table 4, age at operative older 8 years old. There were 26 patients had been excised head of the radius. The was one of them had been Ulnar and Radial Osteotomy. There were 3 of them had been Ulnar and Radial Osteotomy, combined Annular Ligament Reconstruction. Post-Operatively. All patients had Improvements of pain, function of the forearm.

**Complications**

Considering the possible complications of surgery, such as progressive cubitus valgus, weakness, regrowth of the radial head or only poor improvement in functional impairment, most authors agree that the indication for an operation must be carefully considered.

**Pain:** Complications include pain in the distal radioulnar joint due to proximalization of the radius, instability, valgus deformation, weakness and regrowth of the proximal radius. Open reduction, in combination with osteotomy of radius and/or ulna in younger patients is reported to be successful [12,34]. To prevent redislocation in radial head sparing surgery, reconstruction of the annular ligament can be performed [35].

In our study, pain in the wrist in the affected extremities, but clinically there was no obvious asymmetrical radial deviation or ulnar prominence. Despite previous observations a positive ulnar variance in congenital dislocations [1], there was no proximal radial migration in the current study [8]. However, the average ulnar variance of 1.9 millimeters in our series is identical to the value for proximal radial migration that Morrey, *et al.* reported in their patients [8].

Progressive cubitus valgus has often been mentioned as an inevitable consequence of excision of the radial head before the cessation of growth [36].

Regrowth of the radial head and radio-ulnar synostosis have also been reported in the literature [1,37]. Three of the follow-up studies commented on this complication [1]; there were three cases of synostosis and five cases of re-formation of the radial head. This is a potentially toxic and re-growth of the radial head are common after serious complication of excision of the radial head.

### Conclusion

Congenital dislocation of the radial head is rare, although it is the most common congenital anomaly of the elbow. Chronic radial head dislocation can be either congenital or developmental or post-traumatic. The Children in newborn should be examined an elbow carefully, to definite anomalies and follow-up initially of life to later. If no complaints or limitations are presented, the clinical observation can lead to satisfactory results without operation.

We have performed some cases with Ulnar and Radial osteotomy combined Annular ligament reconstruction with good post-operation and safe surgery. If a child complaints or has limitations, he/ she should be operated early to prevent some complications of chronic radial head dislocation.

### Limitations of this study

Limitations of this study include: First, the cohort of patients and the number of congenital are too small to perform parametric statistical analysis. Second, the patient didn't examine in newborn and not to be considered initially of life. Third, most patients were not followed-up until skeletal maturity. Fourth, the subjects of this study were not homogenous in terms of the implants used.

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